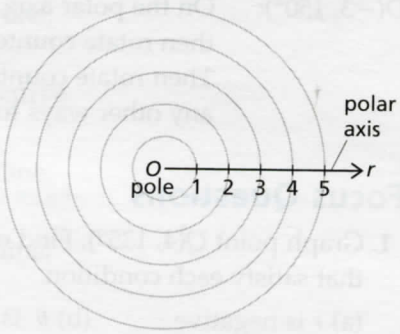
5.2 Polar Coordinates

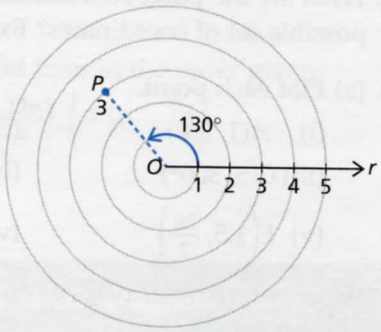
Most graph paper is considered to be rectangular paper; that is, the lines on the graph paper all form rectangles. This is meant for a rectangular coordinate system, on which you graph points in rectangular form (x, y) by referring to perpendicular x- and y-axes. Perhaps you have wondered if there is an alternative to graphing on this paper. In this section, you will learn how to plot and analyze graphs drawn on circular graph paper, called polar paper.

FOCUS E Graphing Points on Polar Paper

Consider a series of concentric circles having a common centre, O, called the **pole**. The **polar axis** is a horizontal ray drawn from the pole in a positive direction (that is, toward the right).



Point P plotted on the graph below is described by a directed distance r from the pole and by the angle that $\overrightarrow{OP}$ makes with the polar axis. The coordinates for point P are $(3, 130°)$. However, there is more than one way to represent the position of point P Its coordinates can be expressed as $(3, -230°)$.



What other ways might there be to express the location of point P?

These coordinates are called **polar coordinates**, and consist of an ordered pair, $P(r, \theta)$, where $|r|$ is the distance from the pole to point P, and θ is the measure of the angle formed by the polar axis and the terminal arm, $\overrightarrow{OP}$

Note

Concentric circles are circles that have a common centre.

pole—the common centre, O, of a series of concentric circles

polar axis—a horizontal ray drawn from the pole in a positive direction

Note

An angle rotated counterclockwise is positive. An angle rotated clockwise is negative.